Behaviour and Larvae of two Rose Chafer Beetles *Eupoecila australasiae* (Don), *Diaphonia dorsalis* (Don) (Coleoptera: Scarabaeidae, Cetoniinae)

BY J. ALDERSON *

Introduction

About 120 species of Cetoniinae occur in Australia, and all are diurnal and feed on nectar. Most species are attractively patterned or have metallic colouring. They are well represented in collections but, as far as I am aware, little is known of their behaviour and their predators, and no descriptions of their larvae have been published.

In this paper observations on the behaviour and the predators of the two rose chaffer beetles, *Eupoecila australasiae* (Don) and *Diaphonia dorsalis* (Don), are reported. Descriptions of the mature larvae of the two beetles are also presented.

Distribution

The two species occur in the coastal region from Queensland to the South Australian border. The specimens of mature larvae described here were

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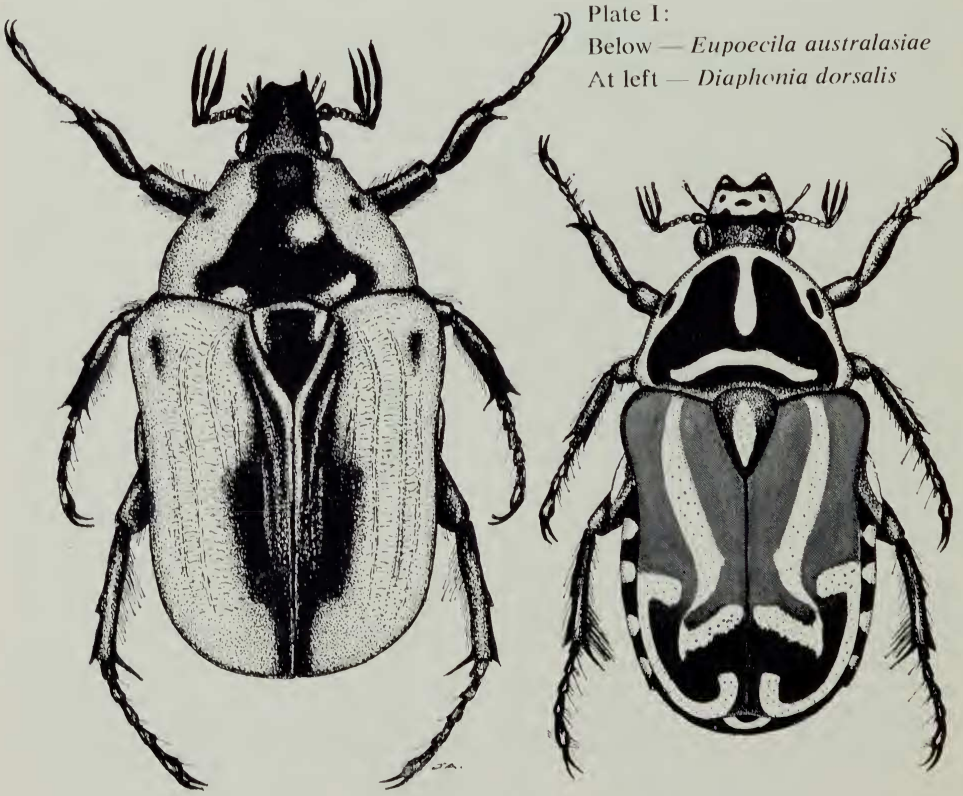

Plate 1:
Below — *Eupoecila australasiae*
At left — *Diaphonia dorsalis*

collected on hillsides north-east of Melbourne.

Adult *Eupoecila australasiae* (plate I) ranged in length from 12 to 22 mm and from late December to early February are often seen feeding on the flowers of Austral grass-tree (*Xanthorrhoea australis*), sweet bursaria (*Bursaria spinosa*), prickly tea-tree (*Leptospermum juniperinum*), *Angophora* and a variety of *Eucalyptus* spp.

Adult *Diaphonia dorsalis* (plate I) ranged from 23 to 28 mm but appeared to feed only on the flowers of eucalypts.

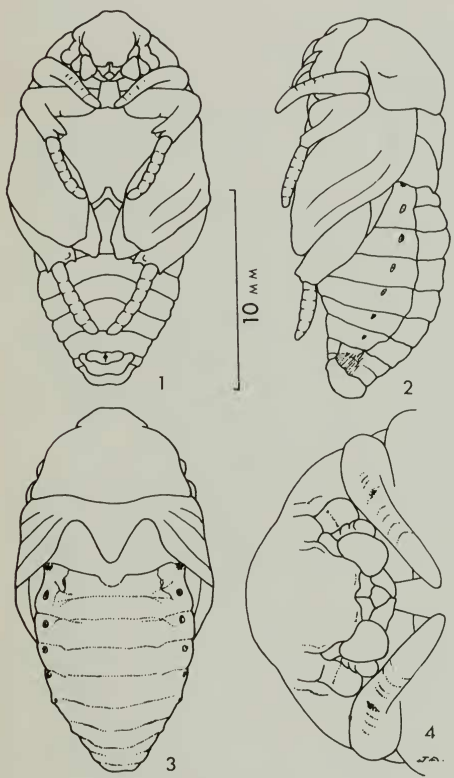

Plate II:
Pupa of *Eupoecila australasiae*
1. Ventral view. 2. Lateral view. 3. Dorsal view. 4. Head enlarged — dorsal.

Behaviour and predators

These fast-flying beetles fold their elytra down in direct but somewhat zigzagged flight which, combined with their habit of feeding concealed deep in blossom, tends to protect them against air-borne attack from birds. After prolonged feeding on eucalypt flowers on hot days (Jan-Feb) individuals from both species have been seen to collide with rocky outcrops or to fall out of trees. Once on the ground the beetles move about in a seemingly intoxicated manner and their feeble unsuccessful attempts to take flight suggests that they are more vulnerable to predation at this time. Black-faced cuckoo-shrike (*Coracina novaehollandiae*) and Australian noisy miners (*Manorina melanocephala*) were seen to prey on beetles on the ground. Examinations of fox (*Vulpes vulpes*) scats have also shown evidence of predation; this may have occurred when the beetles were intoxicated, when they had landed on the ground as the air became too cool for flight, or when they were laying eggs. The remains of *E. australasiae* have been found in trout stomachs examined in the laboratory at the Arthur Rylah Institute.

Larvae

The larvae of *E. australasiae* feed only on woody fibre and are known to inhabit the root systems of grass-trees (Froggatt). During the present study, larvae were found under bark at the butts of dead trees and in fallen eucalypt logs (about 10 years old) which were at the stage of being broken down by cockroaches (Blattidae). The larvae were found to inhabit the old cockroach galleries and to live on the cockroaches discarded wood chewings.

D. dorsalis larvae were found often in association with cockroaches, centipedes or passalid beetles in soil under

eucalypt logs. Both mature and immature larvae migrated to the soil surface on the underside of eucalypt logs during winter months, when the larvae were totally encrusted with particles of soil agglutinated to the body setae. This apparently gives protection against soil-dwelling predators, such as mites. Mites (unidentified) were frequently found feeding on the prespiracular sclerites when larvae were not encrusted with soil particles.

The mature larvae of *E. australasiae* were found to construct pupation cells in autumn (Mar-April) and to pupate in spring (Sept-Oct), the beetles emerging in summer (Jan-Feb). The mature larvae of *D. dorsalis* often dig to a depth of 10 cm to construct pupation cells and the timing of their pupation and emergence of the beetles is similar to that of *E. australasiae*.

The cells of both species are constructed from faecal material; the cell of *E. australasiae* consisted of woody fibre and was oval, about 23 mm long and 15 mm wide; the cell of *D. dorsalis* yielded little evidence of root fibre having been consumed. The method of cell construction was the

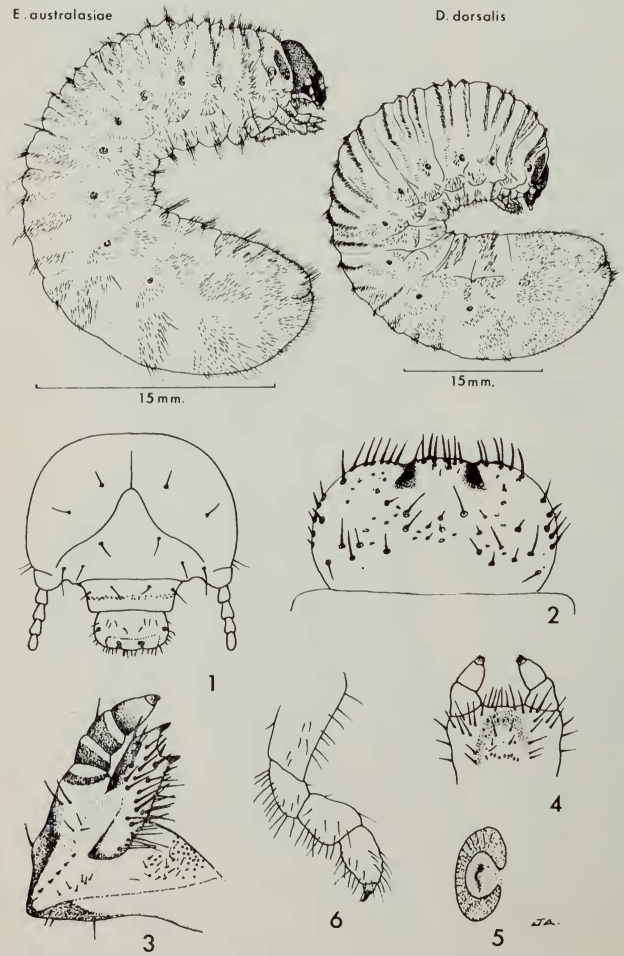

Plate III:

Above left, larva of *Eupoecila australasiae*.

Above right, larva of *Diaphonia dorsalis*.

Fig. 1. Head — dorsal, without mandibles.
2. Labrum — dorsal.
3. Left maxilla.
4. Labium — dorsal.
5. Sclerite.
6. Leg.

same for both species. The larvae induced defecation by stimulating the area above the anal lip with closed mandibles and then worked the faeces into position with the mandibles to form the cell wall. The inner surface of the cell is then trowelled smooth with an up and down movement with the closed mandibles.

General appearance of Larvae of the two species

The structures of ten larvae from each collecting site were examined. Five specimens from each group were preserved and the remainder were bred out.

PLATE III

The larvae of both species vary in size and of 10 specimens of each species examined, *D. dorsalis* ranged from 70 to 95 mm and *E. australasiae* from 55 to 68 mm on the dorsal aspect.

The larvae of *D. dorsalis* is more robust and the head is considerably more retracted than the head of *E. australasiae*.

The larvae of both species are C-shaped, cylindrical, near white in colour, with 10 abdominal segments and a slightly curved, transverse anal opening. Three dorsal plicia occur on segments 1-7 and transverse rows of long setae and more scattered smaller setae, on the dorsum of most segments. Crescent shaped, cribriform spiracles (fig. 5) situated on abdominal segments 1-8 and those of prothorax are dark brown in colour on *D. dorsalis*, light ochraceous on *E. australasiae*.

Head (fig. 1) ochraceous in colour, smooth, broad; half the width of prothorax. Clypeus short, broad, punctate medially, transversely; dark ochraceous on the upper half, creamy on the lower half.

Labrum (fig. 2) dark ochraceous, ovate in shape, tri-lobed, symmetrical and setaceous on apical margin with pigmentation each side of middle lobe. Antennae light ochraceous, four-segmented. First segment longest, cylindrical, narrow basally. Second segment similar but half the length of first segment. Third segment slightly shorter than second segment; somewhat cluvate, exserted antero-ventrally. Fourth segment conical, narrow basally. Mandibles black, asymmetrical; left mandible with four teeth on mesal distal aspect. Stridulating organs occur on ventral mesal aspect of each mandible. Each mandible with pencillus tuft between stridulatory area and pencillus comb on inner base.

Maxilla (fig. 3) consists of cardo, stipes, three-segmented palp and mala with two terminal unci. Maxillary stridulatory area consists of 5-6 stout teeth.

Labium (fig. 4) with a pair of two-segmented palps.

The three thoracic segments each carry a pair of moderately short, four-segmented legs (fig. 6).

PLATE IV

Different characters were found in the epipharynges (underside of labrum); antennae; stridulating organs; tarsungulus (terminal segment of leg) anal segments.

Eupoecila australasiae.

Epipharynx (fig. 1). Epipharynx tri-lobed, symmetrical, with pigmentation each side of middle lobe and a chitinous semicircular carina near distal margin of median lobe. Distal sensory area with a transverse row of 11-12 truncated spines which merge into pointed setae medially and generally form inner margin of paria extending beyond the tormae. Proximad of the anterior transverse row of spines are 7-8 scattered spines. Pedium distinctly scleriotized, devoid of setae. Proximal sensory area with medial, somewhat triangular black sense cone; several fine spines are situated anterior to the sense cone. Pternotorma short and keeled. Dexiotorma long, about one-third the width of epipharyngeal suture. Plegmatium with 5-8 short stout spines. Some 5-8 setae occur on margin of each lateral lobe and some 15 setae are situated on anterior margin of the epipharynx.

Antennae (fig. 2). Terminal segment usually with 6-7 sensory spots on apical half.

Stridulating organs (fig. 3). Stridulating area, ovate in shape.

Tarsungulus (figs. 4, 5). Legs terminate with a strong curved claw, broad basally, with a strong downward directed spine on each side near the base.

Anal segment (not illustrated). Radular with short spetula extending beyond anal lip fold; without a row of pali on each side.

Diaphonia dorsalis

Epipharynx (fig. 6). Epipharynx trilobed, symmetrical, with pigmentation each side of middle lobe and a chitinous semicircular carina near distal margin of median lobe. Distal sensory area with a transverse row of 9-12 truncated spines which merge into a more scattered field of spines and pointed setae medially (inner paria margin ill-defined). Scattered truncated spines proximad of anterior transverse row almost formed into second and third rows. Spines and setae on right side of inner paria thicker than those on left side.

Proximal sensory area (without sense cone) consists of a somewhat quadrate, lightly pigmented medial patch, with four small black sense spots. Some 8-10 small scattered spines are situated transversely, anterior to sense spots on proximal sensory area. Several fine spines are situated on the left side mesal aspect of the pedium. Pternotorma short and keeled. Dexiotorma about $\frac{1}{4}$ the width of epipharyngeal suture. Plegmatium with some 8 short stout spines. Some 15 setae are situated on anterior margin of the epipharynx.

Antennae (fig. 7). Third segment with one dorsal spot and one spot anteroventrally. Terminal segment with 14-16 spots covering most of apical half.

Stridulating organs (fig. 13). Stridulating area, elongate in shape.

Tarsungulus (figs. 9, 10). Legs terminate with a stout tubercle, broad basally, somewhat longer and conical on inner distal aspect from which one spine is situated medially; directed downward. Another spine situated on distal, lateral, aspect is directed forward and slightly downward.

Anal segment (fig. 11). Radular inconsistent in form often with short septula, extending to above anal lip fold and with two rows of 8-12 short, stout, compressed pali, or with 3-5 pali of palidium on basal end of septula.

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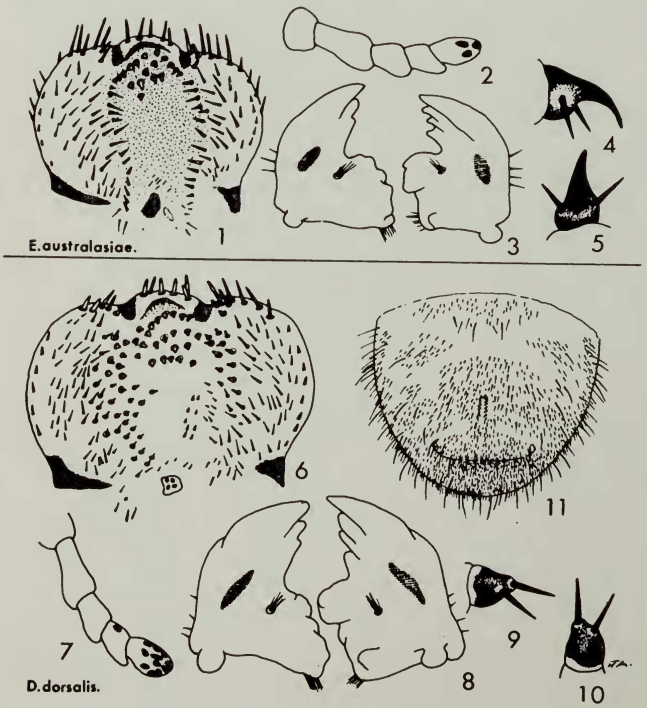

Plate IV:

Above — structures of *Eupoecila australasiae*

1. Epipharynx.
2. Antennae.
3. Mandibles.
4. Tarsungulus, lateral.
5. Tarsungulus, ventral.

Below — structures of *Diaphonia dorsalis.*

6. Epipharynx.
7. Antennae.
8. Mandibles.
9. Tarsungulus, lateral.
10. Tarsungulus, ventral.

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Aldo Massola
Italo-Australian Anthropologist of the Aborigines

When, on 11 November 1975, four months after his death, an obituary appreciation of Aldo Massola appeared in the Melbourne 'Herald', it came as a surprise to many of our members. He was a valued, regular contributor to 'The Victorian Naturalist' and we record this summary of his life.

Aldo Massola was born in Rome and came to Australia, aged 13, when his father was sent out here on business and decided to stay. At Melbourne University, Aldo studied anthropology under Professor Leonhard Adam, from whom he learned the fascination of South-east Asian cultures. Then he undertook the self-imposed task, pursued persistently and lovingly over many years, of rescuing from oblivion what remained of the lore of the Australian aborigines. He was just in time; many of his dark-skinned informants have now passed from this world, and their descendants have little real knowledge of the ancient traditions, languages, customs, etc., and will need to study what has been recorded in the white man's printed books, such as those of Massola.

For ten years Massola was Curator at the National Museum of Victoria, but most of his working life was spent as head waiter at Mario's, Melbourne's best-known restaurant in its heyday when owned by the Vigano family.

Aldo Massola contributed more than 100 papers to scientific and natural history journals; many were published in 'The Victorian Naturalist' during the years 1956-75, most of them reporting discoveries of previously unknown cave shelters and rock paintings. His books include 'Bunjil's Cave' (1968), 'Aboriginal Place Names of South-east Australia' (1968), 'Journey to Aboriginal Victoria' (1969), 'The Aborigines of South-eastern Australia As They Were' (1971), 'Aboriginal Mission Stations in Victoria' and 'Coranderrk: a History of the Aboriginal Station' (1975).

J. A. Baines

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